

Biology and Larval Description of *Procecidocharoides penelope* (Osten Sacken) (Diptera: Tephritidae)

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ABSTRACT

The biology of *Procecidocharoides penelope* (Osten Sacken) is discussed, including its seasonal and geographical distribution and the relationship to its host plant *Eupatorium rugosum*. The mature third-instar larva and puparium are described and illustrated.

Procecidocharoides penelope (Osten Sacken, 1877) is seldom collected, but like many other tephritids it can be collected readily if a large stand of its host plant can be found. In the summer of 1972 a series of this species was collected from *Eupatorium rugosum* Houttuyn. This is the first species in this genus for which a host plant has been reported.

The genus *Procecidocharoides* was erected by Foote (1960) for *Procecidochares penelope* and 3 newly described species. He included a key to genera, wing illustrations and descriptions for all 4 species in the genus.

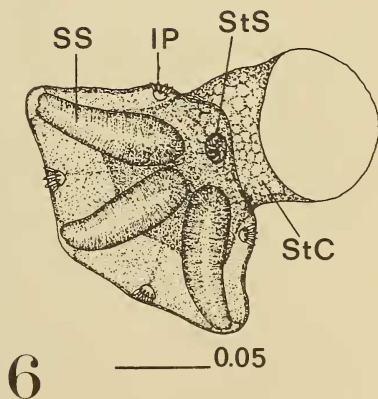
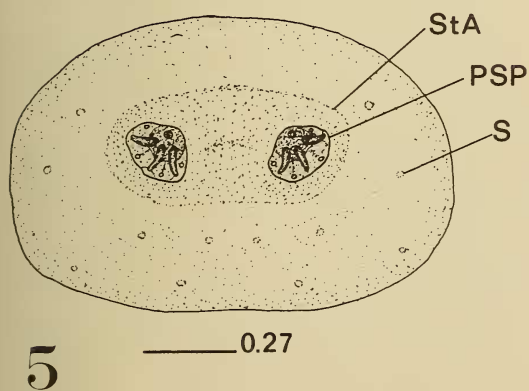
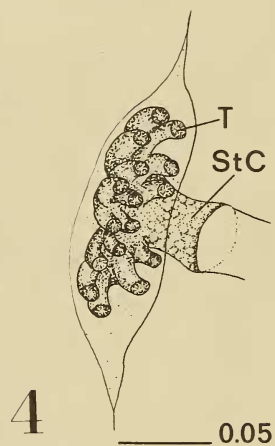
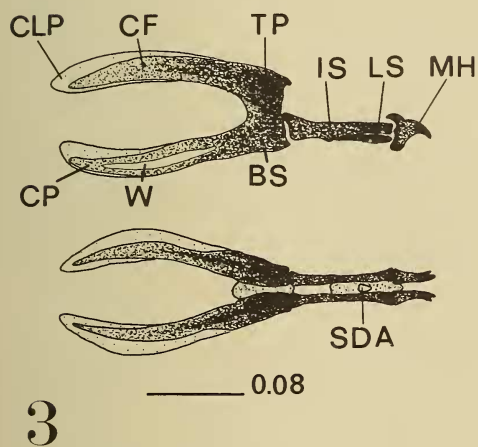
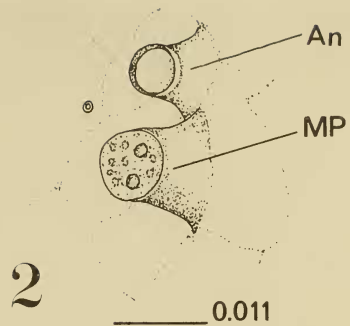
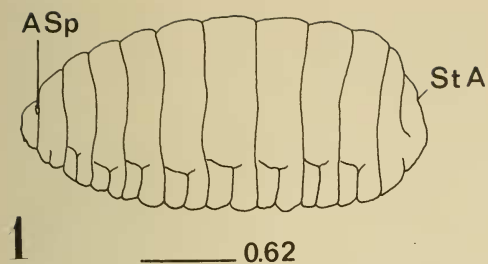
Biology.—The distribution of *P. penelope* as given by Foote (1965) includes Massachusetts, New Jersey, New York, Pennsylvania, Ohio and Michigan. It has also been taken from various localities in Iowa. Its host plant, *Eupatorium rugosum*, or white snake root, is known from New Brunswick to Saskatchewan, south to Georgia and Texas (Gleason, 1968), where it is found in rich woods and thickets.

P. penelope adults occur from June 25 in Iowa to August 26 as reported in Pennsylvania (Foote, 1960). Peak popu-

lations seem to be reached around the first of August.

The larva develops in the heads of *E. rugosum*, destroying nearly all of the 12–24 developing achenes. The flower head of this plant is only approximately 5 mm. in height, and it is surprising that the larva is able to obtain sufficient food in one flower head to mature. No enlargement of the flower head due to infestation was noticed, and no external disfiguration of the head gave any indication of the presence of the larva, at least in the earlier stages of development. Only 2 larvae were taken in 200 heads examined. Larvae were fully developed by mid-September and were leaving the flower heads. By the first week of October no larvae were found in the flower heads. Empty larval sites were found, indicating that the larvae had left the heads to pupate, presumably in the ground.

The method for obtaining reared specimens was to place large numbers of flower heads in plastic bags during September. The larvae would leave the heads as the flowers dried out and could be obtained from the bottom of the plastic bag.



Procecidochares penelope (O. S.): Fig. 1, lateral view of larva; fig. 2, larval antenna and maxillary palp; fig. 3, cephalopharyngeal skeleton; fig. 4, anterior spiracle; fig. 5, caudal segment; fig. 6, posterior spiracular plate (line lengths expressed in mm).

The larvae of *P. penelope* have no spinules and probably are unable to burrow very deeply in the soil to pupate. This lack of spinules is rather rare among tephritids. Of the 45 species described by Phillips (1946), only 2 species, *Procecidochares atra* (Loew) and *P. australis* Aldrich, lack spinules. Both of these species form galls and pupate within them. However, *Procecidocharoides penelope* pupates in the soil. Perhaps the lack of spinules suggests that it once formed galls in which it pupated but now has found a new host plant on which it is unable to produce galls.

Larval Description.—The terminology used in describing the cephalopharyngeal skeleton follows Roberts (1971). Terms used for other larval structures are after Phillips (1946).

Third-instar larva (Fig. 1): length 3.68 mm, width 1.98 mm, light yellow to white. Head region tapering anteriorly, body truncate posteriorly. Twelve to 20 sensilla around each thoracic and abdominal segment. Spinules absent.

Anterior spiracle (Fig. 4): dark yellow, with 3 segments; dorsal and ventral segments subequal, bearing 6 tubules each; shorter middle segment with 4 tubules. Stigmatic chamber indistinctly reticulated, about 8 cells wide and 7 cells long; cells ending before base of tubules.

Antenna (Fig. 2): width 0.011 mm, height equal to width, with a distinct rim distally, less than its width from maxillary palp.

Maxillary palp (Fig. 2): width 0.012 mm, height equal to width, with 2 larger pegs and several smaller pegs set within a distal rim.

Cephalopharyngeal skeleton (Fig. 3): length 0.33 mm, sclerotized dark brown except marginal areas of clypeofrontal phragma and cibarial phragma. Each mandible with 2 teeth, strongly arched dorsally, with pointed tips. Lateral teeth nearly as long as medials. Intermediate sclerite enlarged

distally and mesally. Labial sclerite slender, length 0.14 mm, appearing spindle-shaped laterally but plate-like dorsally and bearing a triangular-shaped salivary duct aperture. Sclerite connecting tentorial phragmata ventrally lightly sclerotized. Basal sclerite dark, with a long narrow window posteroventrally. Clypeofrontal phragma dark anteriorly, with a hyaline margin distally.

Caudal segment (Fig. 5): shagreened, similar to rest of larva, with 16 small tubercles. Stigmatic area with no tubercles, slightly darker than surrounding area.

Posterior spiracular plate (Fig. 6): width 0.18 mm, with four small, distinct, unsclerotized triangular areas near outer edge, each bearing 4 indistinct interspiracular processes. With 3 spiracular slits; outer slits of one plate at 95° to each other. Inner slits of opposing plates nearly parallel, outer slits pointing directly away from each other. Spiracular slits 0.34 mm long, wider medially. Indistinct trabeculae extend from sides of slits, obscuring most of opening. Stigmatic chamber dark; meshes small, inconspicuous and numerous.

Puparium: length 3.25 mm, width 1.7 mm. Black, barrel-shaped. Integument similar to third-instar larva. Anterior spiracles with tubules projecting anteriorly. Posterior spiracular slits easily visible, similar to third larval instar.

References

- Foote, Richard H. 1960. A new North American fruit fly genus, *Procecidocharoides* (Diptera: Tephritidae). Ann. Entomol. Soc. Amer. 53(5): 671–675.
- . 1965. Family Tephritidae, p. 658–678. In Stone *et al.* A Catalog of the Diptera of America North of Mexico. USDA Agr. Handbook 276, 1696 pp.
- Gleason, Henry A. 1968. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada. 3 vol. Hafner Publishing Co., New York.
- Phillips, Venia T. 1946. The biology and identification of trypetid larvae (Diptera: Trypetidae). Amer. Entomol. Soc., Mem. No. 12, 161 p., 16 pl.
- Roberts, Michael J. 1971. The structure of the mouthparts of syrphid larvae (Diptera) in relation to feeding habits. Acta Zoologica (Stockh.) 51: 43–65.